

CLAIMS

1. A gas sensor of the type having a housing defining a chamber within which light is transmitted from a source to a detector through an optical path within the chamber, comprising:
- a source arranged to provide light to a detector through an optical path;
  - at least two reflective surfaces of part ellipsoidal shape arranged to reflect light from the source to the detector through the optical path;
  - wherein the detector is arranged to detect light only from a predetermined directional range such that only light transmitted through the optical path via the at least two reflective surfaces is detected by the detector.
2. A gas sensor according to claim 1, wherein the sensor includes an optical element to select a range of angles of acceptance.
3. A gas sensor according to claim 2, wherein the optical element comprises an immersion lens.
4. A gas sensor according to any preceding claim, further comprising at least a first planar surface arranged within the optical path so as to reflect light from one of the two surfaces of part ellipsoidal shape to the other.
5. A gas sensor according to claim 4, further comprising a second surface with at least two reflective regions arranged within the optical path to reflect light between

the reflective surfaces of part ellipsoidal shape and the first planar surface.

5        6.    A gas sensor comprising a chamber arranged to admit gas, an optical source and detector means sensitive to light from the source, the detector means including a filter, wherein the detector means is arranged to detect light from a predetermined directional range.

10       7.    A sensor as claimed in any preceding claim, wherein the predetermined directional range comprises a predetermined solid angle.

8.    A sensor as claimed in claim 7, wherein the detector means has an axis and the solid angle is substantially centred on the axis.

15       9.    A sensor as claimed in any preceding claim, wherein the optical source is arranged to emit light in a predetermined directional range.

10.   A sensor as claimed in claim 9, wherein the predetermined directional range comprises a predetermined solid angle.

20       11.   A sensor as claimed in claim 10, wherein the optical source has an axis and the solid angle is substantially centred on that axis.

25       12.   A sensor as claimed in any of claims 6 to 11, further comprising reflector means having reflective surfaces in portions of the chamber.

13. A sensor as claimed in claim 12, wherein at least one other portion of the chamber comprises means for admitting gas into the chamber.

5 14. A sensor as claimed in claim 13, wherein the gas admittance means includes sintered material.

15. A sensor as claimed in claim 13, wherein the gas admittance means includes a particulate filter.

10 16. A sensor as claimed in any one of claims 12 to 15, wherein the reflector means comprises curved surfaces defining the foci at which the source and detector are located and a planar reflective surface defining part of an optical path between them.

15 17. A sensor as claimed in any preceding claim, wherein the source is at a focus of a first part ellipsoidal surface and the detector is at a focus of a second part ellipsoidal surface and the first and second ellipsoids share a common virtual focus.

20 18. A sensor as claimed in any preceding claim wherein the source and detector are contained within a flameproof housing.

19. A sensor as claimed in any preceding claim, wherein the housing comprises a cylinder having end walls.

25 20. A sensor as claimed in claim 19, wherein the source and detector are mounted on a common first end wall of the housing.

21. A sensor as claimed in claim 20, wherein the second end wall includes a planar reflector and gas admittance means.

5 22. A sensor as claimed in claim 21, wherein the planar reflector comprises a central region of the second end wall and the gas admittance means comprises a peripheral region of the second end wall.

10 23. A sensor as claimed in claim 22, wherein the gas admittance means further includes a region of the cylinder adjacent the second end wall.

15 24. A sensor as claimed in any preceding claim, wherein the optical source is an infrared source.

20 25. A sensor as claimed in any preceding claim wherein the source is arranged to heat substantially all the surfaces from which light is reflected to a temperature above ambient temperature.